



UNITED STATES NAVY

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Essential Hemoptysis

Hemoptysis is correctly considered to be an ominous sign by physician and patient alike. In from 82 to 96% of various reported series, it has been found to be associated with serious underlying disease; carcinoma, bronchiectasis, and tuberculosis are the three most common processes. Broncholithiasis, bronchial adenoma, foreign bodies, pneumonia, lung abscess, pulmonary infarction, and cardiovascular disease account for most of the remaining cases. Hemoptysis of undetermined origin—the subject of this discussion—varies from 3.8 to 18% in reported series.

With such a serious potential, hemoptysis warrants an adequate diagnostic workup regardless of its extent and whether it has ceased. A negative roentgenogram of the chest in no way relieves the physician of the responsibility for a determined effort to discover the cause of the bleeding. Bronchoscopy and, if negative, bronchography, along with study of the aspirate for tubercle bacilli and malignant cells, constitute a minimum study. Equivocal hilar shadows may require fluoroscopy, laminography, and angiocardiology to settle the question of hilar vessel prominence versus disease process. If the vascular dynamics within the pulmonary tree are suspect as the cause of bleeding, cardiac catheterization may be indicated. There will arise certain instances wherein the physician is not convinced that the blood is actually originating from the tracheobronchial tree. In such circumstances, barium swallow, esophagoscopy, and study of the entire pharyngeal area and sinuses would be in order.

When one has exhausted the diagnostic armamentarium to no avail, the case is variously labeled as idiopathic hemoptysis or hemoptysis of undetermined origin. Speculation as to the subsequent course of this condition precipitated the present analysis in which 97 patients were studied. Fifty-six of the group were between the ages of 40 and 60; 67 males to 30 females is in agreement with the proportion noted in most reports. Forty-four patients were followed for periods ranging from one to 5 years, while 37 were followed for intervals ranging from 5 to 10 years—a total of 83.5% follow-up.

Twenty patients (20.6%) presented the symptom of streaking; 77 (79.4%) were classified as having gross hemoptysis varying from one-half teaspoonful to such an extent that one man required multiple transfusions. It has been suggested that if hemoptysis is recurrent, one must suspect serious underlying disease. Of the group reported, 37 patients either had episodes of hemoptysis extending over a period longer than 6 months prior to examination or subsequently bled at intervals over a period longer than 6 months after examination. Of the latter group, within 3 years, 3 patients showed evidence of serious vascular disease as an explanation of the bleeding. Only 4 patients died—all of causes unrelated to the hemoptysis.

Several theories are presented to explain the pathology or pathologic physiology giving rise to hemoptysis of undetermined origin:

1. Mucosal ulceration beyond vision of the bronchoscopist
2. Undetected bronchiectasis of a single radicle
(The authors consider it impossible to prove or disprove either of the preceding conditions.)
3. Pulmonary hypertension
4. Systemic hypertension
5. Blood dyscrasias
6. Small infarct without x-ray evidence (impossible to prove)
7. Vicarious menstruation (The authors are convinced of the existence of this syndrome.)
8. Varicosities about the carina and upper lobe orifices

Although the authors report that no cases of pulmonary carcinoma or tuberculosis are known to have subsequently developed in this series, it is probably a wise precaution to reexamine by x-ray all patients at intervals of a few months for one year after the original examination. Subsequent episodes of hemoptysis may require repetition of portions of the original study, although the authors' experience would indicate that investigation of the pulmonary artery pressures might prove more productive.

The great majority of cases of unexplained hemoptysis will continue in good health even though over 10% may continue to have occasional episodes of hemoptysis. In an analogous situation in the urinary tract with the same prognosis, the term "essential hematuria" is widely accepted. The authors believe there is equal evidence to support the terminology of "essential hemoptysis" in the cases discussed. (R.J. Barrett, W.M. Tuttle, A Study of Essential Hemoptysis: J Thor Cardiovasc Surg, 40: 468-474, October 1960)

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Anticoagulants in Coronary Heart Disease Progress and Problems - 1960

While anticoagulants in treatment of coronary heart disease are now widely accepted throughout the civilized world and are used daily in treatment of many thousands of patients, some problems relating to their use still remain to be resolved. Cardiologists and internists, as well as many well-trained general practitioners, carry out anticoagulant therapy satisfactorily in treatment of acute myocardial infarction. Treatment is easier with the patient in a hospital, but is possible while the patient is at home, provided accurate laboratory facilities are readily available. The question whether it is desirable to give all patients with acute myocardial infarctions anticoagulant therapy is one that each physician must decide for himself. Under most circumstances, anticoagulants are given if clinical and laboratory facilities are readily available.

Technique of Therapy. Many anticoagulants are available for use by the physician. Heparin still remains the choice when rapid anticoagulant

action is desired. Usually, it is given in dosages of 75 to 100 mg, IV or subcutaneously. In some areas, heparin is used throughout the acute stages of the attack. The Lee-White clotting time—although a crude test—still remains the choice for control of heparin administration.

Many physicians now give from 1 to 4 doses of heparin during the initial period of anticoagulant therapy for myocardial infarction. There is, however, little valid evidence that this is necessary in patients who are not obviously very ill at the time. Given at intervals of 24 hours or more, it has not proved successful. The long-acting preparations of heparin are used less frequently than formerly. Sublingual or oral administration of heparin is of no value for anticoagulation.

Coumadin, Dicumarol, or phenylindanedione are usually started at the same time heparin is begun. They should be administered in an initial large dose, subsequent doses being established by repeated determinations of prothrombin time. A satisfactory prothrombin time should be between one and one-half and twice the normal control prothrombin time.

Contraindications have been reported many times and must be well understood by all who prescribe anticoagulants. All possible complications must be anticipated, careful repeated observations made, and steps taken, when possible, to prevent or counteract potential complications.

Value of Long-Term Therapy. Once the value of administration of anticoagulants during the first month after an acute myocardial infarction was well established, the question arose as to how long anticoagulant therapy should be continued. Series of cases have been compiled to evaluate the problem; the consistency of results revealing strong evidence in favor of long-term therapy cannot be ignored. Analysis of reports indicates: reduction in incidence of recurrent infarction and in mortality during the first 12 months after an acute infarct; decreased incidence of attacks of retrosternal pain in which presence of recurrent infarction was suspected but not verified; decreased morbidity from cardiovascular disease; reduction of development of severe heart failure; more frequent return of ECG to normal pattern; lowered incidence of evidence of thrombosis in the coronary artery at autopsy; and other apparent advantages. Because of less striking effects of anticoagulants after the first 12 months, the question has been raised whether it would not be advisable to consider discontinuing therapy at the end of that period. The experience of the author—and others—has demonstrated a rather sharp increase in thromboembolic complications following cessation of treatment; therefore, this should be undertaken with considerable hesitancy and caution.

Anticoagulants in Angina. It is problematical whether patients should be given anticoagulant therapy when they are suffering from angina without having had definite evidence of myocardial infarction. Some reports indicate considerable advantage; the possibility is worthy of further study. However, the determination of criteria for angina due to coronary artery disease is fraught with difficulty and, in itself, will constitute a demanding study.

Anticoagulants During Surgical Procedures. The question of this employment of anticoagulants is a frequent problem. It has become more sharply focused by reports which indicate that cessation of anticoagulants is associated with increased risk of thromboembolism. Therefore, one should not discontinue anticoagulants without good and sufficient reason in patients who have previously shown a definite thromboembolic tendency. The reason for increase in thromboembolic episodes after discontinuing anticoagulants is not fully understood. It has been rather loosely termed a "rebound phenomenon." This has been difficult to substantiate; another factor may play a leading role.

It has now been clearly demonstrated that major surgery can be conducted successfully with the patient on anticoagulant therapy if the surgeon uses proper and more complete hemostatic techniques. In many places, anticoagulants are not discontinued for extraction of teeth. The general plan is to have the prothrombin time approximately one and one-half the normal control for such procedures.

Relationship of Drugs to Anticoagulant Therapy. The chemical relation of salicylates to coumarin compounds may augment their action on the prothrombin complex. In addition, use of certain gut-sterilizing antibiotics and some urinary antiseptics may result in marked changes in the prothrombin time. It is believed that these drugs may interfere with production of vitamin K by changing the bacterial flora of the gastrointestinal tract. When these or other drugs are administered to the patient on long-term anticoagulant therapy, he should have more frequent determinations of prothrombin time and the physician should be alerted. The patient should be instructed regarding this risk because he may take these drugs on his own or on the prescription of another physician who may not be aware of the details of his anticoagulant therapy.

This consideration points up the importance of training each patient who is to go on anticoagulant therapy regarding various events that may be of new significance to him. If he is alerted to these factors, he may be more intelligent in his own approach to his regimen and in discussing it with other physicians whose services he may require.

Understanding the Clotting Mechanism. The Quick 1-stage test for prothrombin time determinations has been used as a guide in treatment over a long period and has served the purpose well. There are individuals who are more difficult to control or are sensitive to anticoagulants. For them, more detailed studies of the various factors involved in the clotting mechanism are required. Changes in the less well recognized factors may result in unexpected episodes of bleeding or thrombosis when the patient is on apparently satisfactory anticoagulant therapy from the viewpoint of the prothrombin complex 1-stage test alone. Therefore, other more sensitive tests have been developed. The Link-Shapiro modifications of the Quick test, especially with the use of a 12.5% solution, results in a more sensitive determination of the effect of anticoagulants on the blood clotting mechanism.

Owren has previously reported his work with the now widely used P and P test and has recently developed a new method for control of anticoagulant therapy known as the "thrombotest."

Organization for Long-Term Therapy. It has become clear that in order to provide adequate and comprehensive anticoagulant therapy, a team should be developed. In the author's experience, this plan developed into a Long-Term Anticoagulant Clinic which manages all patients on the continued regimen following discharge from the hospital. (I. S. Wright, The Use of Anticoagulants in Coronary Heart Disease - Progress and Problems 1960: Circulation, XXII: 608-618, October 1960)

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Simple Test for Control of Anticoagulant Therapy

The need for frequent determinations of prothrombin time in patients being treated with anticoagulants, and the difficulty in making such determinations in some adult patients—also in children—has led to development of a number of modifications of the original Quick method. Recently, Shoskes and Grunwald described a capillary tube test for whole blood and Ulin and Gollub developed a simple whole blood modification of the Quick technique, enabling a patient to be tested at the bedside or in a physician's office without the need for venipuncture. The authors describe their experimental studies and clinical trials in development of a further simplification of the method described by Ulin and Gollub, with a view to changing most of the equipment required to inexpensive and disposable elements.

The results of the experimental studies seemed to justify clinical trial of the method with polyethylene tubes. Accordingly, the technique was tested in the clinical laboratories of two hospitals with parallel testing by the standard Quick method and the rapid method using polyethylene tubes. Comparison showed close agreement between the results of both tests.

The inherent advantages in the method described are its ease of performance and the inexpensive and disposable nature of the equipment required. The accuracy of the method is entirely adequate for the control of therapy with anticoagulants inasmuch as most clinicians seek results only in general terms, such as "twice" or "three times" the levels observed with apparently normal controls.

The authors have used the method described (1) when patients objected strongly to venipuncture, (2) when veins were small, collapsed, or thickened as the result of repeated venipunctures, or (3) when the physician requested that the method be used. No inadequacy in control of anticoagulant therapy has developed as a result of the intermittent or continuous use of the fingertip method. (M. T. I. Cronin, F. M. Offenkrantz, A Simple Test for the Control of Anticoagulant Therapy: Amer J Clin Path, 34: 346-348, October 1960)

Asterixis in Non-Hepatic Disorders

Asterixis, generally known as "liver flap" or flapping tremor, was first described in 1949 as a characteristic neurologic abnormality of impending hepatic coma. This sign is usually elicited by having the patient extend the forearms horizontally and dorsiflex the wrists. The appearance of sudden, rapid, arrhythmic flexion-extension flapping movements at the wrists gives this phenomenon its colloquial name. Similar to and from movements may occur on sustained positioning of the elbows, tongue, eyelids, or fingers. Further observations originally suggested that these movements represent momentary lapses in the ability to maintain a posture, followed almost immediately by resumption of the original position. Electromyography has demonstrated a brief hiatus in the electrical activity of the contracted muscles which appears to coincide with the flapping motion. The term was coined from the Greek (*sterigma*) which literally means the inability to maintain a fixed posture. This neurologic sign has come to be recognized as the trademark of impending hepatic coma.

The syndrome of impending hepatic coma—which consists of impaired consciousness, asterixis, hyperammonemia, and frequently, of fetor hepaticus—occurs in patients with severe hepatic parenchymal disease or can be precipitated in cirrhotic patients by ingestion of ammonium salts, urea, high protein diet, or absorption of blood from the gastrointestinal tract. In addition, a variety of chemical compounds including acetazoleamide, chlorothiazide, methionine, and amphenone may induce impending hepatic coma or a picture indistinguishable from it in patients with liver disease. Furthermore, a variety of nonspecific factors such as infection, surgical trauma, paracentesis, abnormalities of serum electrolytes, and administration of narcotic, sedative, or tranquilizing drugs may bring about "impending hepatic coma" in cirrhotic patients.

Asterixis has also been observed in cerebral insufficiency of non-hepatic origins—uremia, hypokalemia, and polycythemia with heart failure. During the past decade, asterixis has been observed in patients with mental confusion or stupor in a variety of nonhepatic disorders—most commonly in chronic pulmonary insufficiency with carbon dioxide narcosis. This has been observed also in idiopathic steatorrhea, Whipple's disease, and other malabsorptive syndromes. In one such patient, it appeared to be related to the presence of magnesium deficiency. Also, it has been described in uremia, bromide intoxication, and following intravenous administration of ammonium chloride.

The mechanism responsible for asterixis is unknown. The diversity of metabolic disturbances in which it is encountered argues against a single etiologic factor. The similarity of electroencephalographic patterns in these different diseases—including hepatic coma, uremia, chronic pulmonary insufficiency, and other disorders—implies that this EEG pattern may arise from

many causes. Perhaps many metabolic or toxic disturbances, each acting in a characteristic manner, may depress cerebral metabolism and thus induce a nonspecific syndrome of impaired consciousness, asterixis, and electroencephalographic slowing. The observation that decreased cerebral oxygen uptake occurs in hepatic coma, uremia, and other disorders suggests that decreased cerebral oxygen utilization might be the factor common to all of these diseases.

The pathogenesis of hepatic coma is not entirely clear. Although most cases of impending hepatic coma are attributed to ammonia intoxication, this explanation does not satisfactorily explain all cases of this syndrome. Similarly, impaired consciousness in uremia, pulmonary insufficiency, and other types of coma is not fully understood. In the author's experience, there was no correlation between concentration of blood ammonia and hepatic coma. Therefore, although ammonia-liberating compounds can cause the syndrome of asterixis, it is apparent that neither such substances nor high blood ammonia levels are essential to its production.

Hypercapnia has been thought by some to be responsible for the neurologic status in carbon dioxide narcosis. Again, the author's experience has shown that there is no single abnormality of carbon dioxide content, pH, or related physiochemical alterations which can be incriminated as the cause of the disorder in all such patients.

Arterial oxygen unsaturation was demonstrated in many patients of the author's series, but it was not invariably present. Although it is certainly possible that hypoxia per se may give rise to the syndrome of delirium and asterixis, hypoxemia is clearly not the primary abnormality in all of these patients.

Only two derangements of the serum electrolytes—hypokalemia and hypomagnesemia—have previously been directly associated with asterixis. Although the failure to identify a specific biochemical abnormality common to all diseases manifesting asterixis does not exclude such an abnormality, that the same basic metabolic aberration occurs in each of these diseases seems unlikely. It appears more likely that these diverse disorders may each interfere with a fundamental metabolic pathway at a different point depending on the nature of the primary disease. Ultimate anoxia seems to be the common final result of various possible interferences with metabolism.

The neurologic mechanism responsible for this syndrome is unknown. It is conceivable that depression of the reticular formation of the central nervous system could account for the neurologic picture seen in these patients. Effects on other, non-reticular neural pathways cannot be excluded.

The relationship of infection and fever to this syndrome also deserves comment. Two patients with septicemia and a high fever presented flapping tremor, the course of which closely paralleled the temperature curve.

Explanation for the induction of this syndrome by drugs with various pharmacologic properties is not clear. Asterixis has been seen to occur

following administration of acetazoleamide in cirrhotic patients, and chlorothiazide in patients recovering from impending hepatic coma. The suggestion has been made that brains of patients who have recovered from impending hepatic coma might be more sensitive to many metabolic abnormalities which may result from administration of such drugs. (H. O. Conn, Asterixis in Non-Hepatic Disorders: *Amer J Med*, XXIX: 647-661, October 1960)

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Indications for Tracheotomy

In 1954, the authors presented a simplified guide for use of tracheotomy in poliomyelitis. This guide has served effectively as an aid in guiding attending physicians, residents, and interns to a clinical decision as to whether a tracheotomy is indicated not only in acute poliomyelitis, but in a variety of other diseases which may present similar problems. Such conditions as Guillain Barre syndrome, chronic lung disease, respiratory failure on any basis, diphtheria, and other conditions often present similar problems to that of the acute poliomyelitis patient and fall into certain clinical groups.

While various laboratory determinations, such as vital capacity, tidal air, minute volume, and arterial and/or venous carbon dioxide content are important guides in evaluating the degree of respiratory involvement in poliomyelitis and polio-like diseases, indications for tracheotomy are generally based on clinical grounds.

Tracheotomy accomplishes two functions: bypasses laryngeal obstruction due to vocal cord paralysis or collapse of the supporting neck muscles, and permits removal of secretions obstructing air flow to the lungs.

Clinical Groups

Simple Respiratory Muscle Paralysis. This group is limited to patients who have a significant degree of respiratory muscle paralysis without evidence of brain stem involvement or disorientation of cerebral function. The authors strongly recommend that patients with acute poliomyelitis whose vital capacity approaches 50% of the calculated normal be placed in a tank respirator. In other diseases, such as the Guillain Barré syndrome, the vital capacity should not be allowed to fall below 30% of normal.

Indications for Tracheotomy—Since the patient can swallow without difficulty, normal tracheal and bronchial secretions usually are no problem because they are handled by cilia and respiratory movements. Postural drainage is essential in these cases and the tank respirator should be kept in the Trendelenburg position most of the time. Use of an artificial coughing device is essential in maintaining a clear bronchotracheal tree and in prevention of pneumonia and atelectasis. Patients with mild degrees of

pulmonary infection or chronic involvement, such as bronchiectasis, bronchial asthma, or emphysema may be satisfactorily handled in the tank respirator without tracheotomy, provided the above precautions are taken. However, with severe preexisting pulmonary disease, such as pneumonia, asthma, and bronchiectasis or development of acute diffuse pulmonary involvement—particularly if there is evidence of cerebral disorientation, restlessness, semi-stupor, hypertension, et cetera—tracheotomy may be indicated. If involvement of the brain stem develops with bulbar signs, the same indications as for the bulbo-spinal type would hold.

Bulbar Group with Tenth Cranial Nerve Involvement. In this type there is cranial nerve paresis or paralysis including the tenth nerve without encephalitic signs or clinical evidence of cerebral dysfunction. Frequently, there is associated involvement of the ninth, eleventh, and twelfth cranial nerves. The most common clinical sign in this group is dysphagia with pooling of secretions in the pharynx and often regurgitation of liquids through the nose.

Indications for Tracheotomy—Not all cases in this group require tracheotomy, especially if conservative measures, such as the Trendelenburg position, to accomplish postural drainage and efficient suctioning of the pharynx are instituted. Even though marked dysphagia exists, the cough reflex may be sufficient to keep the trachea and bronchi clear, along with suitable suctioning. Self-aspiration by cooperative patients in this group cannot be stressed too highly. If these conservative measures fail, as shown by restlessness, inability to sleep, disorientation, low degree of cooperation, duskiness, or cyanosis (with or without laboratory confirmation of hypoxia or hypercapnia), tracheotomy should be performed. If the tenth nerve involvement includes vocal cord paralysis indicated by either inability to phonate or stridorous inspiration, tracheotomy is frequently necessary because the force is broken if the cords cannot close and the airway is obstructed if the cords cannot open.

Bulbospinal Group. This clinical group is a combination of Groups 1 and 2. In this group, primary consideration is the close observation of the vital capacity of the patient. Regardless of bulbar findings or whether the tenth nerve or other cranial nerves are involved, the patient should be placed in the tank respirator when his vital capacity approaches 50% of normal.

Indications for Tracheotomy—The indications in this group are the same as for Groups 1 and 2 unless the tank respirator is required. If there is evidence of tenth nerve involvement, clinically demonstrated by presence of dysphagia and/or laryngoparalysis, a prophylactic tracheotomy is indicated, preferably before the patient is placed in the tank respirator.

Encephalitic Vital Center Group. In this group there appears to be generalized involvement of the brain stem, often with evidence of cerebral edema. Frequently, these patients show no evidence of spinal or cranial nerve paralysis. This is the most severely ill group of patients with acute

poliomyelitis; in this group are included most of the fatal cases. Frequently there is involvement of the vital centers of respiration, circulation, and autonomic system control.

Indications for Tracheotomy—Definite indications for tracheotomy in this group of patients are such signs and symptoms as coma or irrational responses, severe hypertension, prostration, various degrees of cyanosis, and unabating fever of 103 to 106 F. Other symptoms of severe disease which necessitate strong consideration of a tracheotomy are presence of respiratory dysrhythmia, fluctuating blood pressure from elevated to depressed levels, and presence or suspicion of pulmonary edema or evidence of hemorrhage either from the lungs or from the G.I. tract. A summation of this group might be that any patient who appears to have a severe overwhelming poliomyelitis infection without distinct localization should be considered a potential candidate for prophylactic tracheotomy.

Care of the Tracheotomy

Once a tracheotomy has been performed, care of the tube, whether metal or plastic, involves certain procedures to meet the tracheobronchial conditions peculiar to an unnatural entrance for inspired air.

Moisture. Inflowing air must be moisturized at the outer tracheotomy tube orifice either by increased humidity in an enclosed tent or by an efficient vaporizer in close vicinity. The former method of draping a saline-soaked gauze over the tube has been abandoned. Since advent of more efficient humidity control, mucolytic agents are less necessary. High concentration of these liquifying chemicals may even prove harmful.

Suction. Frequent aspirations, of course, are necessary; the open-end catheter is preferable to the velvet eye type. Also, the rubber (favored) or plastic tube must be introduced into each bronchus, not just to the end of the tracheal tube. Careful storing of the suction tube is mandatory for sterility.

Supplementary Oxygen. Funnel or positive pressure attachments may be used. Unless the oxygen is to be delivered under pressure, the same tent that is used for humidity may also provide increased oxygen tension for the inspired air. A catheter should never be permitted to dangle in the tracheal tube because direct flow of oxygen in the trachea causes drying of the secretions; resulting crusts obstruct expiration, thus promoting carbon dioxide retention.

Cleansing the Tracheal Tube. The inner tube may be changed and cleaned by the nursing staff. The outer tube should not be changed for 3 days after tracheotomy is made (except in cases of exceptional crusting). Soaking in fresh hydrogen peroxide solution followed by green soap flushes, using a moist cotton applicator, or pulling an opened "4 x 4" gauze through the tube with a hemostat are the most effective means of cleaning. It is not necessary to resterilize the inner tube each time if it is cleaned with green soap. The

frequency for cleaning the inner tube will depend upon the amount of secretions present; usually three times a day will suffice.

Detubing

The time to permanently remove the tube varies with each patient. If a patient can swallow well, even though he still requires the respirator, the tube usually can be removed if the tracheobronchial tree and lungs are free of infection. In cases where it is desirable to leave the tracheal stoma open, a plastic "button" has been found useful. (J. E. Allen, C. S. Blase, Tracheotomy in Poliomyelitis and Similar Diseases: Arch Otolaryng, 72: 450-453, October 1960)

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Impending Volkmann's Ischemia

Volkmann's ischemia is a serious complication of supracondylar fractures of the elbow which, if not promptly recognized and treated, can lead to permanent impairment and contracture of the hand. Fortunately, most patients with vascular impairment associated with supracondylar fractures respond to removal of constricting plasters or bandages, to traction, and other measures. The author reports a case which did not respond to usual routine measures; surgery on the artery was necessary to relieve the ischemia.

Because release of external constriction so frequently relieves ischemia, it has been assumed that this is the sole cause of this condition. This attitude has caused some unfortunate embarrassment for physicians who were blamed for the development of the complication. Although prompt removal of all restricting bandages and plasters is mandatory, there can be no doubt that many cases of Volkmann's contracture have originated without external constriction. Some cases have even been observed on the uninjured leg while both legs were treated with traction for fracture of the femur. Leriche and his co-workers have shown the important role of local vasoconstrictor reflex within the injured artery and have practiced arterectomy. Such a local reflex could explain failures to restore collateral circulation by sympathetic nerve blocks alone.

Following fracture or injury, onset may be acute within hours or insidious within days. The main warnings are "four P's": pain, pallor, pulselessness, and paralysis. Other symptoms are swelling, coldness, cyanosis, and inability to extend the fingers. It is important to remember that pain may be absent, sometimes due to simultaneous nerve injuries or to nerve ischemia. Despite the marked progress medicine has made in this condition, the real cause for shrinkage of a dead muscle which causes the

resultant deformity is still an unsolved mystery. Stasis and silting in arterioles and capillaries, according to Clark, are the causes of these muscle changes, rather than persistent arterial spasm or venous congestion.

Treatment consists first of removal of all constricting bandages and plasters, elevation with or without skeletal traction, and decreasing flexion of elbow until circulation returns. Achievement and maintenance of satisfactory reduction may, in some cases, be therapeutic; in other cases, reduction must be delayed until other measures achieve restoration of circulation. Sympathetic nerve blocking and high spinal anesthesia in the case of involvement of the lower extremities are of value.

If conservative means are of no avail, no time should be lost before surgical exploration. Investigation of the brachial artery and involved nerves is preferable to fascial splitting only. The contracted artery may respond to irrigation with warm saline solution, Novocaine and gentle massage, periarterial stripping, or removal of a considerable length of artery. According to Leriche, by excising the injured part of the artery, the "trigger-point" constricting the collateral circulation is presumably removed.

By these various measures—and especially by early operation—a good number of patients with brachial vasospasm can be saved from having a crippled hand due to Volkmann's ischemia. Severance of continuity of an essentially intact artery, however, should be reserved as the last resort. Because there is no complete uniformity as to the role the venous circulation plays in relation to the arterial circulation, whether the vein should also be ligated together with the artery remains a moot question.

In case of threatening Volkmann's ischemia of the arm, not more than two manipulations of the supracondylar fracture are recommended. Early exploration is essential, but must be cautious as there are numerous anomalies of the brachial artery. (W. Nobel, Impending Volkmann's Ischemia: Amer J Surg, 100: 635-638, October 1960)

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Palliative Surgery for Advanced Malignancy

The value of so-called palliative surgical procedures in patients who are suffering from seemingly incurable malignancy has remained a debatable question in the minds of equally distinguished surgeons. Those who object are quick to point out the high mortality and excessive morbidity frequently encountered in the past. There is also the occasional instance of fulminating overgrowth of residual tumor leading to an early demise of the patient following operative intervention.

Those who advocate a more liberal operative approach object to allowing a correctable complication to persist even in those patients generally

considered to be poor risks for surgery. They believe that the useful and perhaps pain-free days of life gained for the more fortunate few may more than justify the anticipated problems arising in the postoperative period. The controversy is a lively one and frequently takes on the semblance of a moral issue rather than a question to be debated and ultimately decided on a scientific basis.

In considering the evidence for and against each approach, it should be pointed out that the ultimate hazard to the patient is great in either event. The outcome is dependent not only on the site of origin, type, and speed of growth of the malignant tumor, but most often on the altered organ function or pathophysiology occurring secondary to mechanical obstruction from tumor growth. Preliminary treatment directed toward correcting anemia, reduced blood and plasma volume, malnutrition, dehydration and imbalanced electrolytes seen so frequently in these circumstances is an absolute prerequisite to determining operability for palliation. Failure of the patient to respond to such intensive therapy is, of course, just reason for avoiding what certainly will be a fatal operation.

Although absolute knowledge of an extensive and widespread growth with anticipated insurmountable technical difficulties is reason enough to decide against operation, one must be cautious in assuming this to be the situation without direct evidence. A simple cholecystojejunostomy to relieve an unrelenting and tormenting jaundice or an enteroenterostomy for a life endangering obstruction of the small bowel may add months and even years of useful life to these unfortunate people. Furthermore, a hurried and uncertain diagnosis of recurrent malignancy has been known to deter the surgeon from correcting what proved at postmortem to be a late complication of the original cancer operation with no evidence of malignancy being found. In addition, there is increasing evidence of the validity of spontaneous regression of what seemingly was a hopeless malignancy, although, granted, this is rare.

Finally, relentless searching of the thousands of trained investigators in laboratories and in teaching and research institutions is constantly bringing the day closer when all cancers may be controlled to some extent or perhaps cured. If this be the case, then let us take steps to assure that the greatest possible number of patients with cancer will still be on hand to benefit from the new knowledge. (E.H. Ellison, Editorial, Palliative Surgery for Advanced Malignancy: Amer J Surg, 100: 511, October 1960)

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Care more particularly for the individual patient than for the special features of the disease. —Osler

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Is Empiric Gastrectomy Justified?

Often, a patient with massive upper gastrointestinal bleeding is operated upon and after thorough exploration, including a gastrotomy, no source of bleeding is found. Many surgeons recommend that a 70% empiric gastrectomy be done in the hope that the source of hemorrhage will be found by the pathologist in the removed specimen. On some occasions, small erosions have been found, the significance of which is obscure: they are transient and may be found by the gastroscopist in normal control subjects and, apparently, are not related to gastric ulcer. More often, no source of bleeding is seen even after careful examination by the pathologist. However, the patient frequently stops bleeding and makes a good recovery. The logic of doing an empiric gastrectomy has seemed inadequate to some surgeons but not to others. The author presents case reports in an attempt to explain negative findings and shed light on the desirability of empiric gastrectomy.

Palmer (who esophagoscopes and gastroscopes his bleeding patients routinely) lists gastritis as second only to duodenal ulcer in frequency as the etiology of upper gastrointestinal hemorrhage. He also lists 12% as etiology undetermined. Gastritis and undetermined cases easily outrank even duodenal ulcer as a cause of bleeding. The etiology of hemorrhagic gastritis is obscure. It can appear quickly with no apparent cause or prodromal symptoms and seems to subside just as quickly. It may be caused by vascular spasm, shock, emboli from the omentum, intravascular clotting, salicylate ingestion, pseudodoxanthoma elasticum, a hormonal factor, stress, vasoconstrictors, or transfusion reaction. Several of these factors (stress, shock, trauma) might be incurred or made worse by surgery. It has been shown that abdominal trauma and manipulation cause gastric arteriovenous shunts to side-track mucosal circulation with possible mucosal injury.

As illustrated by the author's cases and in animal experiments, hemorrhagic gastric mucosa is largely confined to the fundus and is worse nearest the cardia. This cannot be controlled surgically without total gastrectomy. It would seem desirable to attempt to treat the lesion by conservative means, including gastric hypothermia, if other conservative means are not adequate.

Judging from his own and other observations, the author concludes that it is possible for gastritis to subside or to progress independently of surgery. If a subtotal gastrectomy is performed for hemorrhagic gastritis, in all likelihood, it does not solve the bleeding problem because the process is usually most marked in the fundus; even an extremely small stomach remnant can cause fatal hemorrhage. Therefore, the author proposes that empiric gastrectomy after adequate preoperative and operative diagnostic maneuvers (including gastrotomy and visualization of the entire gastric mucosa) is probably not justified or useful. (COL R.M. Hardaway III MC USA, *Is Empiric Gastrectomy Justified?* Arch Surg, 81: 529-534, October 1960)

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Tuberculosis 1950 - 1959

Statistics relating to tuberculosis during the 10-year period 1950 - 1959 indicate substantial progress in reduction of the incidence of this disease among naval personnel. Much of this improvement can be attributed to establishment of a vigorous control program which requires roentgenographic examination of all incoming personnel, tuberculin skin test of all recruits, immediate isolation of all suspected cases, and contact investigations among close associates of a discovered case.

TUBERCULOSIS CASE RATES, BY GEOGRAPHICAL
AREA: 1958 AND 1959

GEOGRAPHICAL AREA	RATE PER 100,000 AVERAGE STRENGTH	
	1958	1959
Total.....	62.7	52.0
United States Naval districts..	78.3	56.9
1st.....	28.7	53.1
3d.....	60.1	91.3
4th.....	59.2	41.7
Potomac and Severn River Naval Commands.....	35.8	19.1
5th.....	60.9	50.5
6th.....	40.1	38.0
8th.....	33.3	51.6
9th.....	96.4	72.5
11th.....	148.3	78.2
12th.....	69.2	97.5
13th.....	49.7	*10.5
Hawaii.....	72.6	43.0
17th: Alaska.....	*31.0	0
Outside the United States, ashore.....	48.1	38.5
Atlantic.....	27.3	23.3
Pacific.....	58.5	46.3
Ships.....	39.6	47.5

*Rate based on less than 5 cases.

Progress has been steady during the past decade. An indication of the extent of the improvement is provided by comparing the case rates of the extreme years of this period. (Case rate—the number of individuals diagnosed for the first time; incidence—count of diagnoses that may include multiple stages of an illness in one individual.) In 1950, the case rate was 97 per 100,000 average strength; by 1959, this rate had decreased almost 50% to 52 per 100,000. Noneffectiveness of naval personnel due to tuberculosis also declined during the 50's. During 1950, this diagnosis accounted for 6% of sick days resulting from disease; in 1959, it was responsible for only 2% of the total disease sick days.

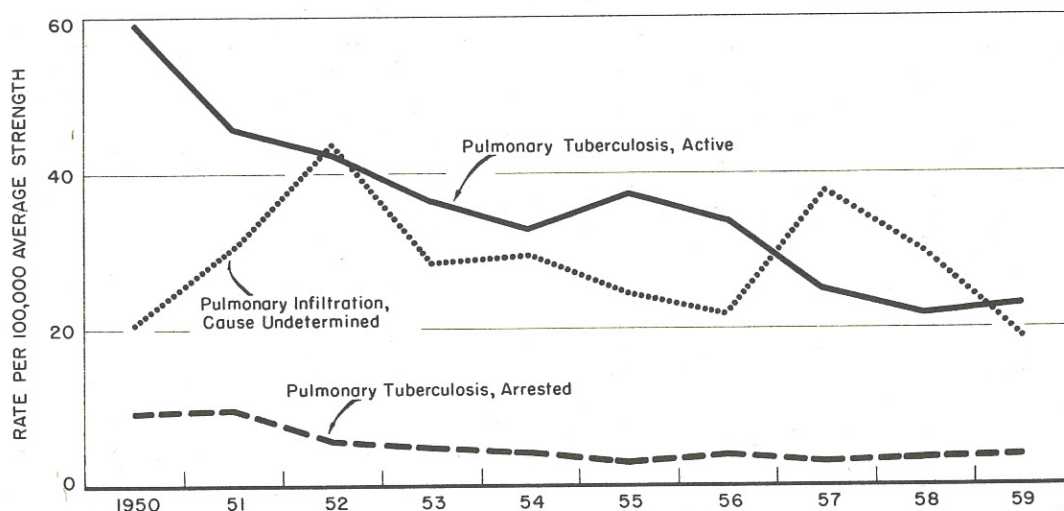
The decline in tuberculosis cases was accompanied by a reduction in deaths and invalidings. During the entire 1950 - 1959 period, a total of 29 deaths were attributed to tuberculosis. The 11 individuals who died from this disease in 1950 constituted a rate

of 2 per 100,000 strength. In contrast, the one death in 1959 resulted in a rate of 0.1 per 100,000. Invalidings also declined steadily during this period. After reaching a peak of 84 per 100,000 in 1952, the invaliding rate commenced a downward trend during the subsequent years, achieving a 10-year low of 33 per 100,000 during 1959. A factor which may have influenced the decline in invalidings during 1958 and 1959 was the administrative change effected during February 1958 which provided for retention for further treatment with a view of returning to duty certain cases which met established medical criteria.

The improved trend in tuberculosis case rates was confined to pulmonary tuberculosis; both active and arrested cases showed declines. Other types of tuberculosis occurred at a much lower rate and showed less fluctuation from year to year. Pulmonary infiltration, however, ended the decade about where it started.

TUBERCULOSIS CASE RATES

NAVY AND MARINE CORPS: 1950-59



Pulmonary Tuberculosis, Active
Pulmonary Tuberculosis, Arrested
Pulmonary Infiltration, Cause Undetermined

A large proportion of tuberculosis diagnosed among naval personnel has been of preservice origin (EPTE) among the recruit population. The difference was most pronounced in 1958 when the rate for the group with less than 3 months' service was almost nine times the rate of the next highest group.

Analysis of tuberculosis cases by geographic area also reflects the recruit influence. In 1958, almost 50% of the cases which occurred in the United States were concentrated in the Eleventh Naval District. The bulk of these (129 of 185 cases) were reported from the two recruit training activities at San Diego. (Statistics of Navy Medicine, Bureau of Medicine and Surgery, September 1960)

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The Surgeon General Returns from Antarctica

RADM Bartholomew W. Hogan, the Surgeon General of the Navy, and Chief of the Bureau of Medicine and Surgery, recently concluded a 6-day visit to Antarctica. As guest of RADM David M. Tyree, Commander of Operation

Deep Freeze 61, ADM Hogan was able to take a first hand look at the United States' McMurdo, South Pole, and Byrd Stations with their respective scientific and naval support activities. He has reported some of his observations.

ADM Hogan was especially pleased with the work of the young physicians of Deep Freeze. "I feel that our medical people have taken hold and given good medical support to the Antarctic program," ADM Hogan said. "The physicians at the U.S. inland stations have the large additional responsibility of being military leaders for the Navy support personnel at these camps. They are serving in a pioneer role. Even though the men in these camps are isolated from the rest of the world, they are given confidence by the very presence of a physician. During my stay at Byrd and the Pole Stations, I saw the greatest of respect shown for the physician leaders who, in many instances, looked like younger brothers of some of their men."

The need for men with sound minds, well instructed in the hazards of Antarctic cold weather, was emphasized by ADM Hogan. "People must understand the reasons for the cumbersome care of their body demanded by the Antarctic," he said, "and must be able to survive even if forced down in an aircraft or stranded out of doors. Playing with cold is the same as playing with fire."

"An Alaskan physician in the Navy Medical Reserve has a continuing project in which he has dealt with over 200 cases of frostbite and freezing without a loss," ADM Hogan continued. "He has developed the theory of quick thawing in which the frostbitten patient is put in as warm an area as possible without the risk of burning him. This theory differs from the old one of gradual warming. But the best medicine is preventive medicine in which men are given proper cold weather indoctrination; this indoctrination must be properly enforced."

"Psychiatric screening is playing an increasingly important part in the Deep Freeze Program," ADM Hogan stressed. "This process eliminates people from going down to Antarctica who would be potential problems in a confined situation. There is no running away there, and having emotionally disturbed asocial personalities creates a great deal of friction which spreads like a contagious disease, affecting the harmony of the entire group."

To aid in selection of personnel, the Navy's Neuro-Psychiatric Research Unit in San Diego will study psychiatric screening reports from Deep Freeze and from around the country with the aim of getting better knowledge of the type of person suited for the rigorous project.

Dangerous flying conditions kept ADM Hogan from visiting Hallett Station where LT Joseph A. Kelly MC USN is Officer-in-Charge. Medical officers currently in charge of South Pole and Byrd Stations are, respectively, LT Phillip K. Schwartz Jr MC USN, and LT Donald R. Walk MC USN. LT Lowell T. York MC USNR is Flight Surgeon at Naval Air Facility, McMurdo Sound. (TIO, BuMed)

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Association of Military Surgeons Elects Officers
U.S. Navy Personnel Win Three of Eight Awards Presented

During the recent 3-day meeting of the Association of Military Surgeons in Washington, D. C., Leroy E. Burney, M.D., The Surgeon General of the U.S. Public Health Service, headed the list of officers elected for the coming year. At the Awards Dinner on 2 November 1960, the final session of the series, U.S. Navy personnel received three of the eight awards given annually; the remaining honors went to civilian personnel of the Army, Air Force, Veterans Administration, and a Pharmacist Director of the Public Health Service.

Other officers elected at the session included RADM Calvin B. Galloway MC USN, Assistant Chief for Research and Military Medical Specialties, Bureau of Medicine and Surgery, who was elected Second Vice President. For planning the association meeting next year which will be held at the Mayflower Hotel, Washington, D. C., 6 - 8 November, Doctor Burney has appointed RADM Kenneth R. Nelson USPHS, Chief Medical Officer, U.S. Coast Guard, to be General Chairman, with Luther L. Terry, M.D., Assistant Director, National Heart Institute, National Institutes of Health, as Chairman, Scientific Program Committee.

Registration for the meeting numbered 2086, with 99 foreign delegates representing 36 countries attending the meetings. Delegates coming the greatest distance especially for the meetings were from Thailand and India. Most of the foreign visitors were those in the Washington area in official capacities with their governments or were attending courses at the Naval Medical School.

Recipients of the awards included:

CDR John H. Schulte MC USN, who received the Sir Henry Wellcome Medal and Prize, established by The Wellcome Foundation of London and awarded annually for the best essay on a military medical subject submitted in competitive contest. CDR Schulte's essay was The Medical Aspects of Closed Cabin Atmosphere Control. He is presently on duty at the School of Industrial Medicine, University of Cincinnati, in a Fellowship in Occupational Medicine.

CAPT David Minard MC USN, Naval Medical Research Institute, Bethesda, Md., who received the Gorgas Medal and Award established by Wyeth Laboratories for distinguished work in preventive medicine for the Armed Forces. CAPT Minard was honored for his work in Heat Stress.

LT Hope McIntyre NC USNR, U.S. Naval Medical School, NNMCMC, who received the Federal Service Nursing Award established by Hoffman-LaRoche Inc., for an outstanding contribution to nursing. This is the first year this award has been presented, and was won by LT McIntyre for her work described in the essay, Report of Three Years' Study and Experience in Establishing a New Teaching Device for Use by the Professional Nurse in the Ward Situation.

In addition to the awards, the Founder's Medal, authorized by the Executive Council in 1941 to commemorate the 50th anniversary of the Association, was presented to RADM Curtiss W. Schantz DC USN, Assistant Chief of the Bureau of Medicine and Surgery for Dentistry and Chief, Dental Division, and CAPT Clifford P. Phoebus MC USN, Commanding Officer, Naval School of Aviation Medicine, Pensacola, Fla., for their meritorious service to the Association. ADM Schantz was General Chairman and CAPT Phoebus was Scientific Program Chairman of this year's meeting—the Association's 67th Annual Convention.

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From the Note Book

Staff, USNH, San Diego, Active in Professional Meetings. In recent months, staff Medical officers of the U.S. Naval Hospital, San Diego, Calif., have participated in professional activities and meetings in various parts of the world. Included are:

CAPT Arthur J. Draper presented a paper, Three Unusual Cardiovascular Malformations Approached Surgically, prepared by himself and CAPT J.M. Hanner at the Sixth International Congress on Diseases of the Chest in Vienna, Austria.

CAPT Rudolph P. Nadbath discussed Contact Lens Fitting at the Pan Pacific Surgical Association Meeting in Honolulu, Hawaii.

LT James P. Russell reported on The Brown Syndrome at the Asia Pacific Academy of Ophthalmology, University of the Philippines, Manila.

LT Ervin L. Lopreis presented a paper prepared by himself and CAPT J.M. Hanner, Measurement of Individual Cardiac Output and Its Duplication During Cardiopulmonary Bypass, at the 35th Anniversary, Congress of the Pan American Medical Association in Mexico City, Mexico.

In addition, LCDR Sara B. Butterfield MSC USN discussed Operations Open Heart, A Military Volunteer Donor Recruit Program, at the 8th Congress of International Society of Blood Transfusion in Tokyo, Japan.

Procedures to Revascularize the Heart. A review of 12 techniques of myocardial revascularization which have been performed clinically for treatment of coronary artery disease is presented. Of the methods, only 3 have been subjected to long-term application. Their results have been comparable especially when performed by the physicians who designed them; however, none of the procedures has been accepted for wide general use. A fourth technique, that of bilateral ligation of the internal mammary artery, has recently received extensive clinical trial even though the physiologic basis for the operation remains doubtful. The remaining operations have either been abandoned or must be considered in the early phase of experimentation. (J. Vansant, W. Muller Jr, Amer J Surg, October 1960)

Effect of Chlorothiazide on Body Fluids. Changes in body fluid, serum electrolytes, and exchangeable sodium have been determined in hypertensive patients taking 1 Gm of chlorothiazide daily for a period between 26 and 60 days. The most consistent change was a decrease in total body water which was believed to come from intracellular water depletion. No consistent changes were seen in plasma or extracellular fluid volume or exchangeable sodium. The importance of this finding in the blood pressure reducing action of chlorothiazide is discussed. (P. Lauwers, J. Conway, J Lab Clin Med, September 1960)

Effort and Occupation in Coronary Occlusion. Data from 2600 cases of acute coronary occlusion convinces the author that occupation, exertion, or state of inactivity played no part in precipitating the occlusion in the cases studied. The author does not believe that coronary occlusion has become epidemic or that it is caused by modern stress and strain. (A. Master, JAMA, October 22, 1960)

Thromboangiitis Obliterans in Women. Since 1908, when Buerger first classified the disease entity which bears his name, there have been hundreds of cases reported in the literature—the majority have been males. The authors report 2 pathologically proved cases of thromboangiitis obliterans in women, and review some of the controversial points concerning this entity. (G. Kaiser, et al, Surgery, October 1960)

Surgical Therapy for Peripheral Arterial Disease. From 154 patients with peripheral arterial disease, the authors made observations that suggested: (1) severe distal rest pain, deep ulceration, and gangrene are contraindications to sympathectomy; (2) at least 42% of patients with intermittent claudication were not improved by sympathectomy; (3) the importance of an unobstructed distal arterial tree in applying endarterectomy or grafting is emphasized; (4) the need for more objective criteria in selection of patients for peripheral vascular surgery is indicated. (D. Strandness Jr, et al, Arch Surg, October 1960)

Local Application of Chemotherapeutic Agents. Because implantation of tumor cells into surgical wounds may be followed by local recurrence of the tumor, use of chemotherapeutic agents for prophylactic wound irrigation is widely studied. The authors report the ratio of destruction of tumor cells to impairment of wound healing in their experience with 8 such agents. They found effectiveness to decrease in the following order: nitrogen mustard, sodium hypochlorite, acriflavine, Clorpactin XCB, Atabrine, actinomycin D, triethylenethiophosphoramidate, and Rivanol. Unfortunately, all compounds tested were of limited value, even nitrogen mustard. (I. Hatiboglu, et al, Ann Surg, October 1960)

Spleen Preparations for Radiation Sickness. There is good evidence that various preparations of spleen are as effective as bone marrow grafts in treatment of lethal acute irradiation sickness in small experimental animals. The authors, employing larger animals (dogs), demonstrated that homogenized spleen gave protection against lethal total body irradiation equal to that obtained with bone marrow at the same dose of irradiation. These findings indicate that homogenization of the spleen releases or makes available substances and/or cells which are not available to the same extent from the intact spleen. (R. Lillehei, et al, Surgery, October 1960)

Silicone to Maintain Patency in Drainage Tubes. Blockage due to blood clot formation within chest drainage tubes has been avoided to a large extent by pretreatment of these tubes with silicone. Application of silicone is a simple matter and can be carried out with a large number of tubes simultaneously. Adoption of this practice in other situations might prove to be similarly beneficial. (G. Harkins, J Thor Cardio Surg, October 1960)

Recognition of Gastric Cancer by Radioautography. A method for early detection and diagnosis of gastric malignancy has been developed which utilizes the selective uptake of radioactive phosphorus (P^{32}) by neoplastic tissues. Preliminary studies with in vivo balloon radioautography indicates a high degree of diagnostic accuracy. This technique may prove useful in detection of asymptomatic mucosal gastric cancer. (N. Ackerman, et al, Ann Surg, October 1960)

Benign Neoplasms of Stomach. A study of experience with 104 benign gastric neoplasms is presented. Adenomas were found most frequently (50 patients); leiomyomas (44 patients) represented the next largest group. Combined totals represented 90.3% of the benign lesions. In general, there are few distinguishing clinical characteristics of these lesions; diagnosis must be made by gross or microscopic examination. (W. Grafe, et al, Amer J Surg, October 1960)

Rapid Determination of Bacterial Susceptibility. A new method for quantitative determination of susceptibility of bacteria to antimicrobial substances is described. Readings are made after an incubation period of 4 hours with antibiotics and 5 hours with sulfonamides. The test is easy to perform and takes few materials. (R. Koopmans, Antibiot Chemother, October 1960)

New Transparent Plastic Surgical Drape. After 2 years of exclusive experience with a new plastic surgical drape, the author states that the members of the surgical service of the Health Center from which he reports are enthusiastic about use of the new drape. The advantages are its flexibility, complete sterility, and transparency. There have been no unfavorable reactions to use of the plastic material. (W. Pace, Amer J Surg, October 1960)

DENTAL**SECTION**Results of Dental Survey

Results of the most extensive survey of dentistry ever made in the United States were announced recently. Carried out by the American Council on Education, the 2-year survey was financed by grants from the W.K. Kellogg Foundation, the Rockefeller Brothers Fund, the Louis W. and Maud Hill Family Foundation, and the American Dental Association.

The survey identified four of the nation's major dental problems:

(1) The American people generally set an astonishingly low priority on dental care. (2) There is an increasing need for more dentists to care for the nation's burgeoning population. (3) Despite the country's great wealth, some of its citizens are unable to pay for the comprehensive dental care that is desirable. (4) Even more extensive use must be made of auxiliaries in the dental field—dental hygienist, dental assistant, and dental laboratory technician.

The largest financial item in the recommendations of the survey was that for the program concerned with dental care of children. It is estimated that the program urged would cost \$120 million the first year, leveling off within 12 years to an annual expenditure of \$940 million. In the area of dental research, the commission suggested that present funds—about \$45 million—be increased to \$1 billion. (Science, 132: 1302, 4 November 1960)

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Status of Dental Research in Fluorides

This report discusses briefly some of the latest evidence regarding the four most popular methods of using fluorides for control of dental caries:

1. Fluoridation of communal water supplies
2. Topical application of fluoride solutions to erupted teeth
3. Supplementation of the daily diet with fluorides
4. Use of dentifrices containing fluorides

Water Fluoridation. The widest use of fluorides for control of tooth decay in the United States is that of fluoridation of communal water supplies. At the present time, over 1500 communities representing a population of more than 32,000,000 are fluoridating their water supplies.

This method has, without doubt, as much scientific support for its safety and effectiveness as any other public health procedure. The epidemiologic evidence on the effects of use of waters containing fluoride is quite extensive, especially in regard to conditions existing in the United States. There is also considerable supportive epidemiologic evidence from other parts of the world.

Chemicals Used. The different chemicals used for fluoridation in the United States vary according to the type of water treatment plant, the source of fluoride compound, size of system, and other factors related to the mechanics of furnishing wholesome and abundant water supplies. At present, most water treatment plants use one of the following: sodium fluoride, sodium silicofluoride, fluosilicic acid, or ammonium fluosilicate. Although there is a preference in recent years in large installations for ammonium fluosilicate, recent reports on use of calcium fluoride are promising and may change this preference.

Topical Application of Fluoride Solutions. Use of fluoride compounds by means of topical application should not be forgotten in view of their value in preventing dental caries. This is especially true in areas where fluoridation of public water supplies is not feasible. Earlier studies by Knutson and others established the fact that caries can be reduced by as much as 40% by use of topically applied solutions of sodium fluoride. Some recent reports suggested a greater reduction in caries following use of stannous fluoride solutions. These claims of increased effectiveness are as yet preliminary and need to be more fully substantiated.

Fluoride Supplements. Use of fluoride supplements to the daily diet for the control of caries presents certain problems, many of which are not involved in the previously discussed procedures. At present, knowledge exists as to the accepted usage, proper dosage, and effectiveness of such procedures. These methods require daily supervision and, to be most effective, should reach children during the period of formation of their teeth. This procedure also holds promise for rural areas, and reports from Switzerland suggest a significant potential in use of fluoride tablets as a method of controlling caries in school health programs.

Fluoride Dentifrices. At present, one can only speculate or theorize regarding the value of fluoride dentifrices for use in control of caries. Results of clinical trials made so far are as controversial as are those which are obtained by use of other dentifrices for control of dental caries. Social and economic factors involved in use of dentifrices of any type do not suggest that a widespread beneficial effect on a total population group can be expected. (F.A. Arnold Jr, The Present Status of Dental Research in the Study of Fluorides: Arch Industr Health, 21: 308-311, April 1960)

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Osteosclerotic Areas in Mandible and Maxilla

In the response of osseous tissue to various inflammatory or traumatic stimuli, imbalances in the equilibrium between bone formation and bone destruction may occur resulting in areas of decreased or increased bone density. One manifestation of such a disturbance may be observed in localized areas of osteosclerosis in the mandible and maxilla. Such areas appearing roentgenographically in the form of radiopacities have been variously termed: condensing osteitis, osteosclerotic areas, sclerosing osteitis, bone whorls, bone eburnation, enostosis, bone sclerosis, chronic productive osteitis, and chronic focal sclerosing osteomyelitis.

This study was undertaken in an effort to evaluate histologically biopsy material taken from bone areas previously diagnosed on the basis of roentgenograms as "areas of osteosclerosis" and to determine the incidence of histologically proved cases of this condition in the group of patients observed.

A survey was made of 927 full-mouth roentgenograms of male patients between the ages of 22 and 56, the mean age being 36 years. Thirty-nine of these patients had localized areas of radiopacity which were diagnosed on the basis of roentgenograms as localized osteosclerosis. Some had more than one such area making a total of 70 separate "lesions." Biopsy specimens were obtained of these radiopaque regions in 21 patients.

To avoid confusion of terminology and simplify the diagnosis of the microscopic sections, the term "osteosclerotic area" was applied and used in this study if the predominating histologic picture was one of a mass of bone trabeculae of much denser arrangement than the surrounding osseous tissue, or a mass or island of compact bone existing within the normal anatomic locus of spongiosa. The histologic responses being observed were recognized, in all probability, as reflecting a stage in a chronic sclerosing osteomyelitic process of the focal type.

Twenty specimens confirmed the roentgenographic and clinical diagnosis of osteosclerosis, whereas one of the specimens revealed the presence of a cementoma.

Of the 70 separate radiopaque areas, only 10 were definitely associated with existing apical pathologic conditions. An additional 5 areas were found to be adjacent to apexes of vital teeth exhibiting no pathologic change. The remaining areas were located in edentulous regions; their association, if any, with previously existing periapical disease could not be determined from oral examination or the case histories.

Complete physical examinations of the patients in this group had been undertaken within 12 months of the oral examinations and all were essentially negative. Physical examinations (which were repeated in 12 instances) and hematologic diagnostic studies failed to disclose any systemic basis for the sclerotic bone areas. Of the total number of cases, only 2 involved the maxilla.

Generally, it is considered that these localized areas of osteosclerosis do not require treatment. Most of the surgical procedures undertaken in this study were for diagnostic purposes and were not intended to render any therapeutic effect.

The results of this study would tend to indicate an incidence of 22 cases per 1000 in the age group observed. A predicted incidence of this condition might be in the order of 4% of the population in the 22 to 56 age group. Thus, the incidence of these osteosclerotic areas would appear to be higher than that inferred by the scattered case reports in the literature.

(CDR P.J. Boyne DC USN, Osteosclerotic Areas in Mandible and Maxilla: J Oral Surg, 18: 486-491, November 1960)

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Surface Acid Penetration into Tooth Slices

The effect of acids on enamel and dentin of human teeth was studied with the aid of specially prepared tooth slices. Sections of longitudinally sliced teeth, protected on the cut sides by cemented plastic, were exposed to weak acid solutions (0.01-0.07 N lactic acid and/or 0.01 N hydrofluoric acid) for periods up to one year. Phosphorus analyses of the acid solutions indicated the degree of solubility of the exposed areas while visual observation permitted determination of the extent of dissolution.

Results indicated that the acids attacked the enamel radially from the point of contact with no selectivity noted for any areas of the enamel. In the dentin, the lactic acid showed no tendency to follow the dentinal tubules. Exposure to methylene blue showed more uptake of the dye into some of the tubules, but the acid progressed evenly along the entire line of exposure. Although the rate of dissolution of the enamel as measured by phosphorus in solution was two to three times faster with hydrofluoric acid than with lactic acid, the area involved was less extensive. Lactic acid produced a whitening of the enamel but no visible erosion; the hydrofluoric acid produced erosion but no whitening. Exposure to lactic acid following hydrofluoric acid treatment showed a slower rate of dissolution for a short period of time. (CDR L.W. Wachtel MSC USNR, Visual and Chemical Effects of Surface Acid Penetration Into Tooth Slices: J D Res, 39: 698-699, July - August 1960)

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CAPT Pridgeon Appears as Clinician. CAPT Charles T. Pridgeon, Base Dental Officer, Marine Corps Base, Camp Lejeune, N.C., was guest clinician at the annual Fifth District Dental Society meeting of the North Carolina Dental Society held recently at the Ricks Hotel in Rocky Mount. Periodontics in Everyday Practice was presented by CAPT Pridgeon.

RESERVE**SECTION**Retirement Regulations Outlined for Reservists

(Concluding article in a series of three)

Voluntary Retirement of Officers After 20 Years' Active Duty. Title 10 United States Code, section 6323 (formerly Public Law 305, 79th Congress), provides that a Reserve officer who has completed 20 years' full-time active duty (including ACDUTRA) in the Navy, Marine Corps, Coast Guard, Army, Air Force, or their Reserve components, at least 10 years of which must be active commissioned service, may—upon application—be placed on the Retired List.

Retirement pay will be computed at 2-1/2% of basic pay at time of retirement multiplied by:

(a) Total number of years of service creditable for basic pay purposes, if on active duty continuously from 1 June 1958 to date of retirement (part of a year of 6 months or more is creditable as a whole year); or

(b) If the member did not serve on active duty continuously from 1 June 1958 to date of retirement, multiplier will be a number equal to the total number of years of service creditable for basic pay purposes as of 31 May 1958, plus the years of service credited to him after that date. (A part of a year of 6 months or more is creditable as a whole year.) The computation is made as follows: Credit one day for each retirement point earned after 31 May 1958 and divide by 360. Example: Assume the Reservist's pay entry base date is 15 September 1940. As of 31 May 1958 and his date of retirement he earned a total of 1086 retirement points through active duty and through correspondence, drill attendance, ACDUTRA, and so on. This total divided by 360 equals 3 years and 6 days of service for multiplier purposes. The Reservist would thus have a total of 20 years, 8 months, and 22 days to his credit. Since his partial year is more than 6 months, he would be credited with a total of 21 years for multiplier purposes. His retirement pay would be figured by multiplying his basic pay at time of retirement by 2-1/2% and by 21 years. (Remember, however, that the Reservist must have spent at least 20 years on full-time active duty.)

Retirement may not exceed 75% of basic pay. Applications should be submitted 6 months before date of retirement desired.

Retirement after 20 or 30 Years' Active Duty. Title 10, United States Code, section 6327 (formerly sec. 413, Public Law 476, 82nd Congress), provides that members who have performed not less than 30 years' active

duty or who have had not less than 20 years' active duty—the last 10 of which shall have been performed during the 11 years preceding their transfer to the Retired Reserve—may be placed in the Retired Reserve upon their application.

Retirement pay under this section will be computed at 50% of the applicable basic pay of the grade in which retired.

In the event a member had previously served satisfactorily, as determined by SecNav, in a higher officer grade than that held at time of retirement, he will be advanced on the Retired List to the higher grade effective on the date of his retirement. In this instance, his retirement pay will be computed as outlined above for those retiring after 20 years' active duty.

Any member of the Naval Reserve who meets the requirements is eligible, except that no person who was not a member of the Naval Reserve or Marine Corps Reserve on 1 January 1953 will be eligible for the provisions of this section. This portion of the law will terminate on 1 January 1973.

Applications should be submitted 6 months before the desired date of retirement.

Retirement of Warrant Officers after 20 Years' Active Duty. Under the provisions of Title 10, United States Code, section 1293, Reserve warrant officers who have performed at least 20 years' active duty (including ACDUTRA) may be placed on the Retired List upon their request.

Retirement pay is computed as outlined above for retirement after 20 years' active duty. Such retirement pay may not exceed 75% of basic pay.

Any warrant officer in the Naval Reserve on active or inactive duty who meets the requirements is eligible. Applications should be submitted 6 months before the desired date of retirement. (The Naval Reservist, November 1959)

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Reserve Research Seminar in Aerospace Medicine

The Fifth Annual Reserve Research Seminar will be held at the U. S. Naval School of Aviation Medicine, Pensacola, Fla., 12 - 25 March 1961. The seminar will feature the latest developments in aerospace medicine related to space travel by primates and human beings. Previous seminars have dealt primarily with human factors in operation of high performance aircraft, and with physical, physiologic, and psychologic support of the naval aviator in fleet operations.

The program arranged for the Fifth Seminar, in addition to the basic problems of selection and training for atmospheric and space flights, will include discussions of basic satellite physics; biologic factors in space flight; exotic environments; radiation hazards in the Van Allen Belts and in outer space; physiologic, psychologic, and psychiatric factors in space flight; and future developments in bioastronautics.

This seminar was initiated and designed especially for non-medical officers of the Armed Forces including line officers as well as staff corps officers in the sciences allied to medicine. Medical officers, however, will find the program interesting and instructive.

A number of special events have been arranged. Trips to outlying fields to observe ground school and basic flight training, helicopter training, and operational training are planned. A one-day trip to the Air Proving Ground Command of the USAF at Eglin Field has always proved to be interesting. The highlight of the program is the observation for one day of flight operations from the bridge of the aircraft carrier, USS ANTIETAM, in the Gulf of Mexico. Social events include a "fish dry" at Barancas Beach and a dinner at the Mustin Beach Club. For the latter, an outstanding speaker from National Aeronautics and Space Administration Headquarters at Huntsville, Ala., will describe recent and future developments in missile and orbital vehicles.

Quotas for this seminar have been granted to the commandants of the 1st, 3rd, 4th, 5th, 6th, 8th, and 9th Naval Districts. While priority is granted to members of the Research Reserve Program, 2105 and 2305 officers engaged in allied medical research are eligible to apply. Applications for active duty for training should be submitted to commandants by 1 January 1961 at the latest. SECRET clearance is required.

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PREVENTIVE MEDICINE

Virological Epidemiology of the 1958 Epidemic of Kyasanur Forest Disease

An important new public health problem in India was recognized in March 1957 when Kyasanur Forest Disease (KFD) was first described in Shimoga District of Mysore State. The infected area is situated just under 2000 feet elevation in the eastern foothills of the Western Ghats in Mysore. The area is about 10 miles square and receives an annual rainfall varying from 30 to 80 inches east to west according to locality. The general terrain is hilly, covered by intermittent tropical evergreen and deciduous forest

which is contiguous north to south for hundreds of miles along the Western Ghats. The forest is interspersed with open, low-lying areas where rice and other crops are cultivated. Villages are usually situated adjacent to the forest at the edge of cultivated areas.

Large numbers of wild monkeys of two species, black-faced *Presbytis entellus* and red-faced *Macaca radiata*, inhabit the forest. It was from blood of a *Presbytis entellus* found moribund in Kyasanur Forest that the first isolation of KFD virus was obtained.

Although caused by a tick-borne virus of the Russian spring-summer (RSS) virus complex, usually associated with central nervous system disease in man, KFD manifests itself as a hemorrhagic fever in more severe cases. As yet, no direct involvement of the human central nervous system by the virus has been observed; the disease appears to be similar to Omsk hemorrhagic fever of Siberia.

Clinical Features. The disease is characterized by sudden onset of fever and/or headache 5 to 8 days after forest exposure, followed shortly by severe pains in the neck (meningismus), low back, and extremities, accompanied by severe prostration and marked inflammation of the scleral and palpebral conjunctivae. An important diagnostic sign in some patients is a papulo-vesicular eruption on the soft palate. Vomiting and diarrhea frequently occur 2 or 3 days after onset. Hemorrhagic signs such as bleeding gums, epistaxis, hemoptysis, hematemesis, melena, and frank red blood in the stools appear at this time. The fever lasts from 5 to 14 days with an occasional febrile exacerbation in the third week. Convalescence is prolonged.

No changes have been detected in cerebrospinal fluid. There is invariably a marked leukopenia with an accompanying thrombocytopenia. Beginning about the fourth day and lasting for the duration of fever, granular casts and red cells may appear in the urine. Death occurs usually in the second week and results from hemorrhagic complications, either oozing of blood into the lungs as a precursor to pneumonia or massive exsanguination into the gastrointestinal tract. Postmortem histology has shown focal necrosis in the liver and sloughing of tubular epithelium in the kidney.

Diagnosis. KFD virus has been observed to circulate in the blood from 2 days before until as long as 10 days after onset of the disease. The virus is remarkably stable in blood serum and is easily isolated by intracerebral inoculation into infant or adult mice. Isolation of virus from blood collected during the acute phase of illness has been the most frequent laboratory substantiation of a clinical diagnosis. Complement-fixation tests using suspensions of first passage mouse brains as crude antigens against standard immune serums provide an early identification of the agent. This often gives a laboratory diagnosis before a convalescent serum specimen showing an increase in specific antibodies can be collected. Some cases seen for the first time late in the illness were diagnosed exclusively by serology.

Epidemiology in 1957. Investigations which led to description of Kyasanur Forest Disease and established an RSS viral etiology were begun by the Virus Research Center, Poona, India, late in March 1957, almost 3 months after the first cases of that year had been reported as enteric fever.

Soon after onset of the monsoon rains early in June, human cases of KFD ceased, probably because of the change of activity of the tick vectors within the forest and the fact that during the heavy rains the villagers spent little time in the forest and engaged instead in the cultivation of rice in open fields outside the forest. The period from January to June is the spring and summer season in this part of India; in these months, the ticks are at maximum activity. Because the 1957 epidemic obviously terminated with the onset of the annual monsoon rains in June and another began at the end of the monsoon season, the epidemic year was defined as beginning in September and ending in August.

The mortality rate in the 1956-57 epidemic of almost 500 reported cases was approximately 10%. The situation was especially serious in that the disease occurred predominantly in young adults (male) who were actively engaged in forest occupations on which families and villages were dependent.

By the end of 1957, accumulated data provided evidence that: (1) there had been a recent introduction of an RSS tick-borne virus into a forested area of Shimoga District, (2) the virus caused a new and fatal disease of indigenous human beings and monkeys, (3) there was rapid extension of the infection to new localities where human beings were being infected, (4) *Haemaphysalis spinigera* ticks which feed commonly on monkeys and birds as well as man were infected and appeared to be the vector, and (5) antibodies in rodents indicated a separate, nonprimate cycle by which the infection might be not only maintained but also spread.

1958 Epidemic. In April 1957, a field laboratory had been established in Sagar by the Virus Research Center for collecting, processing, and transmitting human, primate, rodent, avian, and arthropod specimens to the main laboratory in Poona. Specimens were collected primarily by medical, entomologic, zoologic, and subsidiary personnel of the VRC staff in close collaboration with the Sagar Secondary Health Center and the Sorab Secondary Center, and with the medical and public health officers of the Mysore government in collecting specimens and following up reports of dead monkeys and new cases discovered in the course of these field investigations.

KFD virus was isolated in January, February, April, and May of the 1958 epidemic from wild monkeys found dead in the infected area. The simultaneous epizootic in monkeys indicates that the monkeys are valuable sentinels and could provide a mechanism for spread of the infection to new localities as in sylvan yellow fever. However, antibody studies failed to demonstrate neutralizing antibodies in serums of healthy monkeys collected anywhere outside this epidemic area. A significant incidence of KFD positive monkeys within the epidemic area showed that many monkeys survive the infection—

an observation supported by experimental infection in the laboratory. Study of the entire experience of virus isolation from human, monkey, and tick hosts from March 1957 through August 1958, indicates that, within limitations of the collecting techniques, virus was recovered in almost every month. Therefore, the virus must be permanently established in that area.

In 1958, the actual number of cases was fewer than in 1957, with an earlier cessation of cases in 1958, diminishing in April, and ceasing by the end of May. This pattern was the result of unseasonal rains early in April which produced monsoon conditions about 6 weeks earlier than in 1957 and were a major factor in limiting the number of cases in 1958. There were 466 reported cases in 1957 compared to only 181 in 1958; the mortality rate dropped from 10 to 3%.

Almost all cases occurred in the previously infected area. It is important to note that the cases occurring in new adjacent areas were found early in the season. The rapid spread of 1957 did not continue in 1958, aborted in part by the early rains. The occurrence of significant numbers of cases in 1958 in the 1957 epidemic area is further evidence that the infection is well, and probably permanently, established in that region and will continue to be a threat to nonimmune, unprotected persons exposed in the infected forest areas. (T.H. Work, F.R. Roderiguez, P.N. Bhatt, Virological Epidemiology of the 1958 Epidemic of Kyasanur Forest Disease: Amer J Public Health, 49: 869-874, July 1959)

* * * * *

The Tuberculin Test

The intradermal tuberculin skin test using 0.0001 mgm (5 tuberculin units) of PPD is one of the most specific skin tests known; its value in case finding in the U.S. Navy is unsurpassed by any other diagnostic procedure. Efficacy of the tuberculin test has been demonstrated again during the past 18 months in studying outbreaks of tuberculosis aboard two Navy destroyer-type ships. The tuberculin test converted from negative to positive in the presence of laboratory proved infection with *Mycobacterium tuberculosis* even though there were no symptoms, physical findings, or radiographic changes suggesting active disease produced by the infection. The obvious importance of recognizing infection with *Mycobacterium tuberculosis* is that the infected individual may be given the advantage of close medical supervision and, thus, active disease prevented. At least, early diagnosis provides the individual with a chance for minimal morbidity and removes a potential health hazard from the ship or station.

The value of the tuberculin test to the individual and to the Navy depends on proper technique of administering the inoculation, interpreting the results, and recording the interpretation in the health record.

Article 15-91, Manual of the Medical Department, gives specific instructions regarding administration of the tuberculin test, interpretation of the reaction, and recording the results. The value of the test will be completely lost if the entire procedure is not performed in accordance with these instructions. If the proper strength PPD is not used or, if the strength used is not recorded, it is impossible to compare results of any subsequent test with the tuberculin test performed on entry into the Navy. If needles and syringes are used for other inoculations, a minute quantity of the material may remain in spite of the best possible cleaning with the result that the allergic response may be due to PPD, or possibly the other material, or a combination of both.

Laboratory and clinical experience has revealed that the measurable allergic response is maximal in 48 to 72 hours. Furthermore, the response to be measured is not redness but swelling which may not be visible but can be felt; however, no visible or palpable reaction will be evident unless administration has been intradermal. The area of swelling may not be completely symmetrical, but the limits of the widest diameter should be determined and measured in millimeters. The importance of actual measurement cannot be overemphasized because there is accumulating evidence that infection with "atypical" acid-fast organisms may cause a minimal reaction to PPD in some individuals.

If the test is not recorded properly, subsequent tuberculin tests cannot be compared to the initial skin test and it may be impossible to determine early infection with *Mycobacterium tuberculosis*. Proper recording includes date, strength of PPD administered, and actual number of millimeters of swelling measured 48 to 72 hours after the intradermal inoculation. (Tuberculosis Control Section, PrevMedDiv, BuMed)

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Tropical Diseases

Although the following editorial was directed to British physicians, the subject is of particular interest in naval medical practice.

Now that Africa is accepting the civilization of Western Europe, and is trying to adapt it to African needs, there is more exchange between Africa and Europe than ever before. Until a few years ago, such exchange was mainly commercial; but now the most numerous exchanges are of teachers and students. Our visitors from Africa or from parts of the world largely peopled by Africans, such as the Caribbean Islands, include some who settle in this country to raise a family. Migrants may bring with them inherited metabolic peculiarities which in their original environment were either advantageous or

neutral, but which in the new environment may be neither. Such, for example, is the record of sickle-cell disease in Portugal where it was introduced about 300 years ago from West Africa, while in Sicily and Greece, this disorder was probably introduced much earlier. In Britain, it has been found that the differential diagnosis of hemoglobinopathies is important in all large cities because immigration from Africa, the West Indies, Italy, Cyprus, and Greece is considerable.

However, immigration today is chiefly for shorter periods: students and workers come from Ghana, Guiana, Trinidad, or the Cameroons; beauty queens from Jamaica or Nigeria; film starlets from the Ivory Coast or from Martinique. They come, not by the old slow surface transport, but by air and they bring with them infective diseases, especially those with long incubation periods or no very obvious clinical manifestations. Thus, the anemic Trinidadian lad may have hookworm and the chronic urticaria plaguing the school teacher since his return from West Africa may be caused by the microfilaria *Acanthocheiloneima perstans* in his blood—even though the textbooks unite in saying that this filaria is nonpathogenic.

The most important and common of tropical diseases is malaria. Benign tertian malaria due to *Plasmodium vivax* is often with us, usually as relapses after inadequate treatment. Fortunately, as this common form is self-limiting even though relapses are usual an error of diagnosis is unlikely to be fatal. This, however, is far from true of malignant tertian malaria due to *P. falciparum* which not only is fatal, but also is clinically more protean than is the benign infection with *P. vivax*. Benign tertian malaria usually produces paroxysms of ague; malignant tertian may produce regular or irregular fever of any severity, and collapse with subnormal temperature, vomiting and diarrhea—or even, after a fever of quite short duration, the rapid onset of confusion and coma. Further, the plasmodia are sometimes difficult to find in blood-films; in one recent case, no parasites could be found in the peripheral blood on six occasions, although they were readily discovered in the bonemarrow.

Clearly, in the differential diagnosis of pyrexia of undetermined origin, the recent travels of the patient constitute a most important guide. At least one patient has died lately from malignant tertian malaria because too little notice was taken of his journeys and the diagnosis was made too late. If a patient with fever of unknown origin has recently been in a malarious area (such areas should be taken to include all of Africa, most of Asia—including India and Burma—much of the Mediterranean littoral, and the Americas between the tropics), then his fever should be presumed to be due to malaria until this has been disproved, if need be by a therapeutic test. Treatment may reasonably be deferred until an attempt has been made to verify the diagnosis. But in this country, if the history and the clinical manifestations suggest malaria, a diagnostic therapeutic test is desirable even when no parasites can be found in the peripheral blood. The experts

on tropical medicine may claim that any competent microscopist will find plasmodia in the peripheral blood when fever is due to malaria. However, in Britain this is not always true, especially in primary infections with *P. falciparum* or relapses of infections with *P. vivax*. Symptomless infections with *P. falciparum* are not rare among those who have lived on the West Coast of Africa. Clearly, the use of blood from a donor who has spent much of his life in West Africa may be dangerous to the recipient; the development of a fever of uncertain origin within a few weeks after blood transfusion should henceforward raise a suspicion of malaria.

Other infections, once thought to be exclusively tropical, are now appearing. Returned servicemen or holiday-makers may develop the hectic fever of Mediterranean leishmaniasis (kala azar), another disease not usually encountered in England, but fairly easily diagnosed by the positive serum flocculation tests (Kunkel, thymol, Sia) and leukopenia. So far, Oroya fever (bartonella infection) and Chagas' disease (Brazilian trypanosomiasis) have not appeared in England, but the latter is expected to appear fairly soon. Just now, malaria from Africa is the great danger; this will be controlled only when every practicing physician thinks of this possibility and takes a history of travels abroad. (The Lancet, 27 August 1960)

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How Much Health Do We Really Want?

Part of the challenge of the new decade is meeting the need for new definitions and redefinitions of old familiar terms. This is a need which has been forced upon public health workers by the rapidly moving technology and social advances of recent decades.

Most reactions to impediments in public health progress—at least those that are peculiarly subjective and emotional—are based on the assumption that every one wants to be healthy all the time. And by "health" we have most frequently meant the absence of recognizable pathology: first, physical; more recently, mental and emotional as well. But is this basic assumption really true? If there is any question about its validity based on the old and narrow definition of health, then how can we possibly expect it to continue to hold good when based on newer concepts of health which go beyond the absence of pathology?

Most members of the public health profession should be rather sophisticated with regard to attitudes about health. Occasionally—but not as frequently as we should—we realize that amongst our own peers the struggle for existence has given way to what Julian Huxley has called "the struggle for fulfillment." In this process, many of the popular pressures for public health programs and services as they were formerly known have been lost. For instance, in those days when nearly every family had suffered from tragedy

due to diphtheria, scarlet fever, or infant diarrhea, was it not inevitable that individual and community pressures for a child health program would have been greater than they are now? We fight harder to survive than we do to enjoy that survival.

Yet it seems, in today's shrinking world, that we cannot dissociate ourselves from those places where there is still a very real struggle for survival. Certainly, we cannot dissociate ourselves from the times through which we have lived when health goals were more elemental, nor can we dissociate ourselves from those changes in our society's culture which shape the attitudes and reactions about health and even our desire for health.

New Health Criteria

With all of these changes in socio-economic circumstances relating to health, it is vital that new criteria be adopted for measuring health. Long outdated are the simple mortality figures of Farr's day, and almost equally outdated is reliance solely on reported morbidity figures. Concern must now be with measurements such as the new indices used by the U.S. National Health Survey: for instance, restricted-activity days, bed-disability days, work-loss days, and school-loss days. These are approaching the more sensitive indicators that are needed for the refinement and sophistication of health programs today.

The author suggests that other kinds of indices are needed as well: new ways of measuring the resistance of individuals and groups to stresses, be they physical or emotional. Perhaps some of the experience in testing groups of volunteers for travel in outer space may ultimately give some leads as to useful indices to be applied closer to home. Another possible source of useful information is the studies of the relationship between vehicular accidents and psychologic traits being carried out in different parts of the country.

Even with existing knowledge, it should be possible to establish more frequently the "profile of resistance" to disease characteristic of any community or group. Whether use of records of immunization with agents of known effectiveness or use of a sampling technique actually to measure antibody levels, this kind of profile is now feasible with regard to a number of diseases.

The obverse side of this coin is the actual occurrence of morbidity and mortality. Although findings should no longer be limited to these indices, still more should be done with them than in the past. With census tract data on socio-economic population characteristics freshly available in urban areas, they should be related to mortality and morbidity figures to provide the clinician with a series of probabilities of specific diagnoses in various segments of the population within his own community. These probabilities—by age, sex, location, occupation, and other factors—need not be "average" figures for the nation or state. If they are, they lose significance for the practitioner in the local community.

To return to the possibility of establishing better psychologic indices; although this is farther in the future, it is not unrealistic to theorize that some time there will be established the same kind of community profile for resistance or susceptibility to emotional problems and mental disease, and for measuring conflict or harmony among groups. Recently, Cassel and others (Department of Epidemiology, School of Public Health, University of North Carolina) have made specific suggestions as to categories of indices in the psychologic and sociologic evaluation of the health status of groups: for the former, the assessment of adaptive capacity, reaction to noxious stimuli, defensiveness and pathologic end-states; for the latter, adequacy of fulfilling an acceptable social role within the family, at work, and in the community. This is the kind of suggestion that public health workers might well help to test out.

Only thus, by developing the proper indicators and applying them to all segments of the population, can we really have the knowledge needed to direct preventive services to those groups which will benefit most by them.

Conclusions

The understanding of many things, both great and small, has widened amazingly during the past few years. Members of the public health profession cannot cling longer to the old idea of "health" and be satisfied that all people will seek it. The stage of concern over simple survival has been passed—health horizons must now be expanded to include physical and mental performance levels, to encompass the measurement of emotional depth and stability, to comprehend the evaluation of family solidarity and group interpersonal relationships.

There was no lay demand for increased parameters of human experience in outer space, for the development of untold new sources of energy, for speeds not seriously visualized by the man on the street; dedicated technicians kept thrusting forward in these fields. The dedicated technicians in health promotion and in the prevention of disease must do likewise. What "people" may "want" in the way of health on any particular day is not enough. Understanding the time, the place, and cultural characteristics which condition their wishes, new criteria must be utilized to open fresh vistas, not just of disease avoidance, but of productiveness, individual happiness, and group accord which will be so inviting they cannot fail to follow. (B. F. Mattison, *How Much Health Do We Really Want: Baltimore Health News*, XXXVII: 85-91, November 1960)

In order that people may be happy in their work, these three things are needed: They must be fit for it; they must not do too much of it; and they must have a sense of success in it. —Ruskin

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